WORK PLAN

WORK PLAN FOR SUPPLEMENTAL SOIL AND GROUNDWATER ASSESSMENT

Former Electrolux Jefferson Facility
601 East Central Street
Jefferson, Iowa

Prepared For: Electrolux North America, Inc.
20445 Emerald Parkway, S.W.
Suite 250
P.O. Box 35920
Cleveland, Ohio 44135

515395
RCRA

January 2012

Project No.: 103-87305

A world of capabilities delivered locally

Golder Associates

Table of Contents

List of Figures

List of Attachments

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

Golder Associates Inc. (Golder) prepared this Work Plan on behalf of Electrolux North America, Inc. (Electrolux), for the former Electrolux manufacturing facility located at the 601 East Central Street in Jefferson, Greene County, Iowa (Site) (see Figure 1). The properties surrounding the Site are shown in Figure 2.

This Work Plan describes the objectives and methods proposed to further assess soil and groundwater quality conditions at the Site. The investigation approach includes the collection and analysis of real-time soil and groundwater quality data to allow for adjustments of the number, location, and depth of samples to be collected as the investigation proceeds. This "dynamic" work plan approach will allow for an efficient and targeted assessment of Site conditions.

1.2 Site Background

The approximately 20.75 acre Site was improved by an approximate 75,542 square-foot single-story former manufacturing/office/warehouse building constructed in 1960, with additions constructed in 1973, 1980, 1988, and 1992 (see Figure 3). The area of the Site formerly used for manufacturing operations encompassed approximately 7.5 acres of the property owned by Electrolux. The remainder of the property, south and east of the Site buildings, has historically been and is currently leased for agricultural use as shown in Figure 2. According to the City of Jefferson Zoning Department, the Site and properties located northwest, west, and south are zoned Light Industrial. Properties located to the northeast and east are zoned HD Holding (e.g., can be used for agricultural purposes).

White Consolidated Industries developed the Site in 1960 to manufacture dishwasher motor transmissions. Electrolux closed the Jefferson plant in March 2011, decommissioned and removed the manufacturing equipment and other items from the Site buildings, and subsequently demolished the Site buildings. The concrete building slabs, parking areas, and sidewalks are still in place. Following the demolition, a chain-link fence was installed around the entire perimeter of the former manufacturing area.

Site records indicate the use of five underground storage tanks (USTs), registered with IDNR (registration No.: 198603490), to store petroleum products including cooling oil, used oil, and hydraulic oil. Electrolux removed and/or closed in place all five USTs in the mid to late 1980s and 1990. On January 11, 1991, Electrolux received a No Further Action letter from IDNR regarding the UST removal activities performed in 1990. There are no available Site records indicating a release occurred from the closed-in-place and/or removed USTs.

According to former Site personnel, the facility formerly had two aboveground degreasers and one solvent aboveground storage tank (AST). The former solvent AST was located in a small building located on the western side of the main Site building. There are no available Site records indicating a release occurred from the former degreasers or former solvent AST.

According to the Greene County Assessor's Office, the Site is referenced as Parcel Pin # 11-05-400-007 and was formerly serviced by municipal sewer, natural gas (propane tank), electricity, telephone, and municipal water as shown in Figure 3. The demolition contractor has disconnected all the utilities in accordance with local regulations, with the exception of the main water supply line that is awaiting final disconnection by the City of Jefferson in the spring of 2012. The building was constructed with a slab-on-grade concrete floor, with sub-grade machine pits and trenches, metal walls, and a metal truss roof.

Properties immediately adjacent to the Site include (see Figures 1 and 2):

- North: East Central Street and further north, agricultural fields
- East: Agricultural fields
- West: A railroad spur servicing a feed grain company located north of the Site and further west, North Cedar Street and residential properties
- South: Railroad tracks and agricultural fields

1.3 Previous Site Assessment Activities

As part of facility closure activities, Electrolux commissioned Golder to review the Site history and develop a preliminary environmental assessment plan to evaluate subsurface conditions downgradient and exterior of the Site building. Golder performed two phases of environmental assessment including:

1. Groundwater Flow Direction Assessment: Golder advanced ten boreholes and installed nine monitoring wells to assess shallow (i.e., upper 12 feet) groundwater flow direction across the developed portion of the Site in November and December 2010. A phreatic surface contour map developed from data collected during this assessment is presented as Figure 4.
2. Soil and Groundwater Assessment: Golder assessed soil and groundwater conditions downgradient and exterior of the Site building in March and April 2011. The findings of the limited Phase II Site Assessment indicated that petroleum and chlorinated volatile organic compounds (CVOCs)-impacted soils and groundwater are present along the southern edge of the Site building. Specifically, Golder identified Trichloroethene (TCE) and diesel/motor oil at their highest concentrations in soil and groundwater near monitoring wells MW-19 and MW-22, respectively (see Figure 5). Golder submitted a report summarizing the assessment activities to Iowa Department of Environmental Resources (IDNR) on May 13, 2011. Golder did not observe impacts along the downgradient boundary of the former manufacturing area and it is Golder's opinion that impacted groundwater does not extend to the Site property boundary.

Based on the results of this preliminary assessment, Golder has prepared this proposed Work Plan at Electrolux's direction.

1.4 Work Plan Objectives

Electrolux proposes to perform additional assessment of soil and groundwater conditions beneath and adjacent to the former manufacturing building to meet the following objectives:

- Identify the source(s) of petroleum and VOC impacts detected in soil and groundwater along the southern edge of the building.
- Further define the horizontal and vertical nature and extent of VOC-impacted groundwater beneath and adjacent to the Site building.
- Obtain supplemental soil, water quality, geologic, and hydrogeologic information to support an evaluation of remedial alternatives.

Section 2.0 of this Work Plan provides a description of the Site geology and hydrogeology and a summary of **Electrolux's current understanding of** the nature and extent of soil and groundwater impacts at the Site. Section 3.0 outlines the proposed assessment activities, including field assessment and sampling techniques and procedures. Section 4.0 presents the proposed schedule and reporting activities.

Golder developed Field Methods and Standard Operating Procedures (SOPs) to provide guidance during the assessment phase of Site activities. The Field Methods and SOPs include:

- Utility Locating
- Field Log Book and Field Forms
- Sample Identification
- Equipment Decontamination
- Chain of Custody
- Quality Assurance/Quality Control
- Soil Boring and Soil Sampling
- Groundwater Sampling
- Investigation Derived Wastes
- Borehole Abandonment
- Slug Testing

The Field Methods and SOPs are provided in Appendix A.

2.0 CONCEPTUAL SITE MODEL

This section presents the current Conceptual Site Model (CSM). The following description of geology and hydrogeology is based on information collected by Golder in 2010 and 2011 (Golder, 2011). A complete listing of documents reviewed in the preparation of this Work Plan is provided in Section 5.0.

2.1 Geology

2.1.1 Regional Geology

According to the Bedrock Geology of South-Central Iowa (Pope, 2002), bedrock underlying the Site belongs to the Cherokee Group comprising lower Middle-Pennsylvanian deposits of shale, sandstone, coal, and mudstone. These materials were deposited in various environments that resulted from glacial-eustatic rise and fall of sea level (Heckel, 1994). According to personal communication with Mr. Bob McKay, of the Iowa Geological Survey, depth to bedrock is approximately 200 feet near the Site.

The City of Jefferson 2010 Consumer Confidence Report (CCR) on Water Quality indicates that Pleistocene alluvial sands and gravel overlie bedrock in the Jefferson area. Boring logs for wells advanced near Jefferson obtained from the Iowa Geological Survey on-line website, indicate that approximately 100 feet of glacial till overlies the Pleistocene sand and gravel unit. The glacial till consists of clays and silt with occasional cobbles and boulders. The CCR indicates, "**the Pleistocene aquifer was** determined to be not susceptible to contamination because the characteristics of the aquifer and overlying **materials prevent easy access of contaminants to the aquifer.**"

According to the US Department of Agriculture on-line soil survey for Greene County (USDA, 2009), the surficial soils on the former manufacturing area of the Site include the Clarion Loam (Map ID 138B2) and the Canisteo Clay Loam (Map ID 507). These glacial deposits include silts and clayey loams to a depth of at least five feet below ground surface.

2.1.2 Site Geology

During advancement of the shallow soil borings in 2011, Golder observed a soft to stiff, light olive gray to gray/dark gray sandy clay, with trace gravel to a terminal depth of approximately 30 feet (Golder, 2011). The sandy clay had intermittent thin (i.e. 0.25 to 1-inch thick) sand seams at several locations. The moisture content of the clay was dependent on the density of the clay (i.e., the softer the clay the higher the water content). Golder did not encounter bedrock during the 2011 assessment.

2.2 Hydrogeology

2.2.1 Regional Hydrogeology

As described above, the Jefferson area is underlain by fine-grained glacial till up to 100 feet or more in thickness. This till confines the underlying Pleistocene sands and gravels, which are used for potable water sources. The City of Jefferson obtains its potable water supply from these Pleistocene sand and gravels. Drillers logs obtained from the Iowa Geological Survey website indicate that the Pleistocene aquifer can produce approximately 50 to 500 gallons per minute. According to the Iowa Geological Survey, there are no potable water wells located within one-half mile of the Site.

2.2.2 Site Hydrogeology

Figure 4 presents an interpreted groundwater phreatic surface elevation contour map based on water levels measured in March 2011, which indicates that shallow groundwater within the till flows towards the south. The depth to groundwater, as measured in the Site monitoring wells, ranged from approximately two to eight feet below ground surface. As observed during groundwater sampling, recharge into the monitoring wells screened in the sandy clay was slow. Some monitoring wells required more than 24 hours for water levels to recover to static conditions after purging, indicating that the Site soils are characterized by a low hydraulic conductivity consistent with the soil type. Given the low hydraulic conductivity of the soils and the relatively shallow hydraulic gradient, **it is Golder's opinion that** groundwater flow velocities are low.

2.3 Nature and Extent of Soil and Groundwater Impacts

2.3.1 Soil

Petroleum and CVOC-impacted soils are present along the southern side of the former Site building (see Figure 5). Soil impacts near the southern side of the former Site building include Total Petroleum Hydrocarbons (TPH) as gasoline, oil and grease, and Total Extractable Hydrocarbons (TEH). Findings from the 2011 assessment activities indicated that TPH, oil and grease, and TEH soil concentrations decreased with depth to below laboratory reporting limits or one to two orders of magnitude lower than the concentrations reported for the preceding interval. Based on these observations, **it is Golder's opinion** that the vertical extent of petroleum impacts in soil are limited to an approximate depth of seven to ten feet below ground surface (i.e., concentrations below laboratory reporting limits).

CVOC-impacted soils were identified at one borehole (MW-19), which was advanced to a depth of 12 feet below ground surface. CVOCs were detected in all soil samples collected from this borehole with the exception of the surficial soil sample (i.e., 0 to 2.5 feet below ground). The vertical extent of the CVOC-impacted soil at borehole MW-19 has not been delineated. Primary CVOCs detected in soil samples from MW-19 include:

- TCE
- Tetrachloroethene (PCE)
- 1,1,1-trichloroethane (TCA)
- 1,1,2-trichloroethane
- 1,1-dichloroethene

- 1,1-dichloroethane
- cis-1,2-dichloroethene (cis-1,2-DCE)

2.3.2 Groundwater

CVOCs detected at concentrations above their respective Environmental Protection Agency's (EPA) Drinking Water Maximum Contaminant Levels (MCLs) in groundwater samples collected from monitoring wells located adjacent the former Site building include:

- TCE
- PCE
- TCA
- cis-1,2-DCE
- 1,1,2-dichloroethane
- 1,1-dichloroethene
- 1,1-dichloroethane
- 1,2-dichloroethane
- Vinyl chloride

Petroleum compounds that exceeded EPA's Tapwater Regional Screening Levels in groundwater samples collected from monitoring wells located adjacent to the former Site building include:

- Total Extractable Hydrocarbons
- Xylenes
- Ethylbenzene
- Naphthalene

As indicated in Figure 5, petroleum and CVOC-impacted soil and groundwater are limited to the former manufacturing area of the Site. Golder did not detect any VOCs or petroleum compounds at concentrations above MCLs and/or laboratory reporting limits in groundwater samples collected from the monitoring wells installed along the southern boundary of the former manufacturing area. Agricultural fields, owned by Electrolux, are located south and east of the developed portion of the Site. It is Golder's opinion that the low permeability soils limit the potential for transport of the detected petroleum compounds and CVOCs observed in soil and groundwater near the former building and that impacted groundwater has not migrated off the property owned by Electrolux.

3.0 SOIL AND GROUNDWATER ASSESSMENT

To meet the objectives outlined in Section 1.3, Golder has developed a flexible assessment approach based on the collection and analysis of real-time data to allow for field adjustment of the number, location, and depth of probes, borings, and samples to be collected as the assessment progresses. As such, the scope and extent of this supplemental assessment activities described below are subject to refinement during the course of the field assessment based on the judgment of the Project Team.

The supplemental assessment includes the following tasks:

- Refinement of the CSM
- A subsurface assessment consisting of a membrane interface probe/electrical conductivity (MIP/EC) survey and Laser-Induced Fluorescence (LIF) survey
- Soil sampling and analysis
- Monitoring well installation and groundwater sampling and analysis
- Groundwater level measurement and slug testing

The following sections describe the scope of services for each of these tasks.

3.1 Refinement of the Conceptual Site Model

To more fully-develop the existing CSM and to allow for refinement of the model as new field data are collected, Golder will create a three-dimensional geologic and geochemical computer model of the Site using Environmental Visualization System/Mining Visualization System (EVS/MVS®, C-Tech Development Corporation, 2008) modeling software. Golder will input existing Site subsurface information into the EVS/MVS® model to enhance the three-dimensional definition of the Site soil and groundwater impacts.

Data collected during the assessment activities will be incorporated into the EVS/MVS® model as the field assessments progress to update the CSM. The updated CSM will be used as a decision making tool for the adjustment of drilling and sampling locations. EVS/MVS® is particularly useful for evaluation of MIP/EC and LIF data (see Section 3.2). At the completion of the field assessments, Golder will use the model to assess the vertical and horizontal extent of soil and groundwater impacts.

3.2 MIP/EC and LIF Screening Surveys

The nature and extent and potential sources of petroleum compounds and CVOCs impacts to soil and groundwater will be assessed through the implementation of MIP/EC and LIF screening surveys. Golder will use the results of the MIP/EC and LIF screening surveys to select locations and depths of soil and groundwater samples.

The use of MIP and LIF techniques were developed to provide rapid, real-time qualitative assessment of subsurface impacts from petroleum and CVOCs. Both technologies can be utilized in unsaturated and saturated soils that can be penetrated using standard direct-push technology (DPT) drilling methods.

The MIP detects the presence of total VOCs in the vapor, sorbed, and dissolved phases. The permeable membrane, which is located on the side of the probe, is a thin film polymer impregnated into a stainless steel screen for support. The membrane is heated to approximately 100 to 120 degrees Celsius to accelerate the volatilization of VOCs near the probe. A clean carrier gas is continuously swept behind the membrane, which creates a concentration gradient, thereby causing the volatilized VOCs to diffuse across the membrane into the carrier gas. The carrier gas then flows to separate gas detectors located at the surface, including a photo-ionization detector (PID), a halogen specific detector (XSD), and flame ionization detector (FID).

The PID is most effective at detecting aromatic hydrocarbons such as benzene, toluene, ethylbenzene, and xylene (BTEX compounds). The XSD is most effective at detecting chlorinated compounds such as TCA and TCE. The FID is most effective at detecting aromatic hydrocarbons beyond the typical ranges of the PID. Information from the detectors is logged in real-time as the probe is advanced into the subsurface, thereby producing a continuous log of relative VOC concentration with depth.

The detectors do not provide a quantitative concentration of VOCs in the groundwater or soil and requires the collection of soil and groundwater samples to verify the results. However, the response level from the detector correlates to the concentration of VOCs present in the carrier gas, which is proportional to the concentration of VOCs in the soil or groundwater at the MIP location. The MIP equipment is a proven technology for delineating source area soils and groundwater and can typically detect CVOCs down to approximately 500 parts per billion or lower depending on Site-specific conditions. The MIP also includes a soil electrical conductivity (EC) probe, to identify changes in soil type, providing a detailed profile of subsurface lithology that can be correlated to the MIP response.

The MIP/EC assessment will be initiated in the immediate area of the following borings and/or monitoring wells:

- GP-01: During the 2010 assessment activities, Golder advanced a soil boring to 30 feet below ground surface with continuous soil sampling to develop a lithologic profile for the Site. A MIP/EC probe (MIP-1) will be advanced adjacent to this boring to observe the EC response. Golder will compare the EC response to the lithologic profile from GP-01 to evaluate the effectiveness of the EC in identifying changes in lithology. In addition, because GP-01 is located on the upgradient side of the former manufacturing building in an area believed to be free of petroleum and CVOC impacts, the MIP data from MIP-1 will be used to evaluate "baseline" MIP responses.

- MW-16: MIP-2 will be advanced adjacent to monitoring well MW-16 where TCE was detected in groundwater at a concentration of 223 ug/l. MIP-2 will be used to evaluate whether the MIP is capable of detecting CVOC concentrations in this CVOC-concentration range.
- MW-19: MIP-3 will be advanced adjacent to MW-19 where the highest TCE concentration was detected in groundwater (i.e., 189,000 ug/l). Golder will use information from MIP-3 to evaluate MIP response in an area of known CVOC-impacts.
- MW-21: MIP-4 will be advanced adjacent to MW-21 where the laboratory detected TEH constituents including diesel, gasoline, and motor oil, oil and grease, and some gasoline constituents in soil and groundwater. Golder will use this boring location to evaluate the MIP response in an area of known gasoline-range petroleum impacts.

Figure 6 shows the initial MIP locations. Following these initial probes, a series of probe transects will be completed beneath and adjacent to the former Site building parallel and perpendicular to groundwater flow centered near MW-19. Probes will also be advanced at or adjacent to areas of interest such as known or suspected former solvent storage and use areas. The advancement depth of the MIP/EC points will be based on the relative MIP response at each probe location. Golder will evaluate the MIP/EC data daily and will modify the probe locations and depths as appropriate based on the findings.

Golder will perform the MIP/EC investigation in general accordance with American Society for Testing and Materials (ASTM) *Standard Practice for Direct Push Technology for Volatile Contaminant Logging with the Membrane Interface Probe (MIP)–D7532-07*.

The LIF technology detects the presence of light, non-aqueous-phase liquids (LNAPL) in the subsurface. The chemical sensor consists of a laser that fires short pulses of light into an optical fiber that runs through the probe. As the laser pulses pass into the soil through the probe window, LNAPL responds by giving off a characteristic "glow." This emitted light is carried back to the surface over a second optical fiber, and its relative strength measured with a detector. The optical screening method provides a nearly continuous profile of LNAPL distribution as the probe is advanced into the subsurface. LIF is a qualitative technology and requires the collection of soil samples to confirm the presence and type of LNAPL in the subsurface.

Golder will perform the LIF survey to assess the potential presence of LNAPL along the southern edge of the building and beneath the Site building near former sumps, trenches, and petroleum storage locations. The LIF assessment will be initiated with three probes (LIF-1, 2, and 3) in the area of MW-21, MW-21A, and MW-22 (see Figure 6). If the LIF method proves capable of identifying petroleum impacts/LNAPL in this area of the Site, the survey will be extended beneath the former building. Based on the previous soil sampling data for petroleum constituents, Golder anticipates that the LIF points will be advanced to an approximate depth of ten feet below ground/concrete surface (i.e., petroleum impacts based on soil analytical data were typically non-detect approximately seven to ten feet below ground surface). Golder will evaluate the LIF data daily and will modify the probe locations and depths as appropriate based on the findings.

Given the nature of the overburden materials, it is anticipated that the probe holes will remain open following the removal of the MIP/EC and LIF probes. Therefore, if the MIP response indicates significant impacts at a given probe location, the driller will immediately grout the boreholes with a cement-bentonite slurry using a tremie pipe following completion of the probe. Otherwise, the driller will abandon the boreholes at the end of each day in accordance with the SOP provided in Appendix A.

The driller will decontaminate the down-hole direct push tools between boring locations in accordance with the SOP provided in Appendix A. Field personnel will place the Investigation-derived waste (IDW) (e.g., drill cuttings, development and purge water) into 55-gallon drums that will be managed in accordance with the SOP provided in Appendix A.

3.3 Soil Borings and Sampling

Based on the results of the MIP/EC and LIF surveys, Golder will select boring locations and sample depths for the collection of soil samples for laboratory testing. Targeted areas will include locations with high MIP/LIF responses. However, a limited number of soil samples will also be collected in areas of low MIP/LIF responses to confirm the absence of chemical impact. A number of the boreholes will be completed as groundwater monitoring wells as described in Section 3.4. Golder will collect the soil samples in accordance with the SOP provided in Appendix A.

The number and location of soil borings will be based on the results of the MIP/LIF surveys. At this time, Golder anticipates that the soil sampling program will include:

- Advancing up to 20 soil borings to an approximate depth of 12 to 15 feet below ground surface (ft bgs) using a DPT rig and collecting continuous soil samples. Soil samples will be lithologically logged and screened using a photo-ionization detector (PID).
- Collecting up to two to three soil samples per boring for laboratory analysis. Golder will submit the soil samples to a state-certified laboratory under appropriate chain-of-custody protocols (see Chain of Custody SOP in Appendix A) for analysis of one or more of the following:
  - VOCs using EPA Method 8260B
  - TEH using Iowa Method OA-2
  - Oil and grease using EPA Method 1664A
  - Resource Conservation and Recovery Act (RCRA) metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) using various methods.
- Collecting up to five petroleum-impacted soil samples for analysis of polychlorinated biphenyls (PCBs) using EPA Method 8082.

- Collecting up to ten soil samples for waste characterization. Collected samples will be analyzed for the following parameters:
  - Toxicity Characterization Leaching Procedure (TCLP) VOCs using EPA Method 8260B
  - TCLP semi-volatile organic compounds using EPA Method 8270C
  - TCLP Metals - if the laboratory detects elevated levels of metals, Golder will instruct the laboratory to analyze the soil samples for TCLP metals (three metals per sample)
  - TCLP herbicides using EPA Method 8151
  - TCLP pesticides using EPA Method 8081
  - Sulfide using EPA Method 9012 Mod
  - Cyanide using EPA Method SW 9012 Mod
  - Flashpoint using open cup Method ASTM D92
  - pH using Non-aqueous Method SW 9045D

3.4 Monitoring Well Installation and Groundwater Sampling

Golder will select the location and depth of groundwater monitoring wells based on the results of the MIP/EC and LIF assessment. Targeted areas will include zones of high MIP/EC and/or LIF response. The groundwater monitoring well installation and sampling program will include:

- Installing up to ten 1.5-inch diameter, polyvinyl chloride (PVC) monitoring wells. The monitoring wells will be constructed using ten feet of pre-packed well screen and two to five feet of riser. The driller will place sand in the annulus to approximately two feet above the well screen and then complete the monitoring well by placing bentonite chips to the ground surface. Wells will be completed with a flush-mount protective cover.
- Collecting groundwater samples from the ten newly-installed monitoring wells and from two existing monitoring wells located along the former manufacturing area boundary (i.e., MW-10 and MW-14) and from nine existing monitoring wells installed along the southern end of the Site building including MW-15 through MW-23 using low-flow purging and sampling techniques.

  During prior evaluation of groundwater levels at the Site, Golder observed that water levels in most monitoring wells recovered very slowly. Therefore, the new wells will be allowed to stabilize for at least two weeks prior to sampling. If there is sufficient yield, Golder will collect field water quality parameters including specific conductivity, pH, dissolved oxygen, and temperature. Golder may have to collect groundwater samples without purging the monitoring wells. Golder will submit the groundwater samples to a state-certified laboratory for analysis of VOCs using EPA Method 8260B and for TEH using Iowa Method OA-2.
- Subcontracting an Iowa State-certified surveyor to survey the location and elevation of the ten newly-installed monitoring wells and new boring locations.

Golder will perform the groundwater purging and sampling in accordance with the SOPs provided in Appendix A.

3.5 Water Level Monitoring and Slug Testing

The water level monitoring and slug testing program will include:

- Collecting one round of water level measurements from the ten newly-installed monitoring wells and from the 23 existing monitoring wells installed in November 2010 and March 2011
- Performing rising-head slug tests in monitoring wells MW-5, MW-6, MW-9, MW-11, MW-15, MW-22, and MW-23. The slug testing procedure is provided in Appendix A

4.0 SCHEDULE AND REPORTING

Golder is prepared to initiate the scope of services outlined in this Work Plan as soon as the spring season permits (hopefully late March to early April) of 2012. Field assessment activities are anticipated to be completed within approximately 50 days, including mobilization and two weeks for groundwater stabilization prior to sampling. The actual schedule will be subject to subcontractor availability and weather conditions.

Within 60 days of receipt of validated analytical data, Golder will prepare an Assessment Report presenting the results of the assessment activities, including a description of implemented field activities and procedures, field and laboratory data results, an updated CSM, and recommendations for any further assessment work.

5.0 REFERENCES

American Society for Testing and Materials, 2007 "Standard Practice for Direct Push Technology for Volatile Contaminant Logging with the Membrane Interface Probe (MIP)–D7532-07." July 2007.

City of Jefferson, 2010 Consumer Confidence Report on Water Quality for the City of Jefferson, Iowa.

Golder Associates, 2011, "Letter Report, Former Electrolux Manufacturing Facility, 601 East Central Street, Jefferson, Iowa" May 13, 2011.

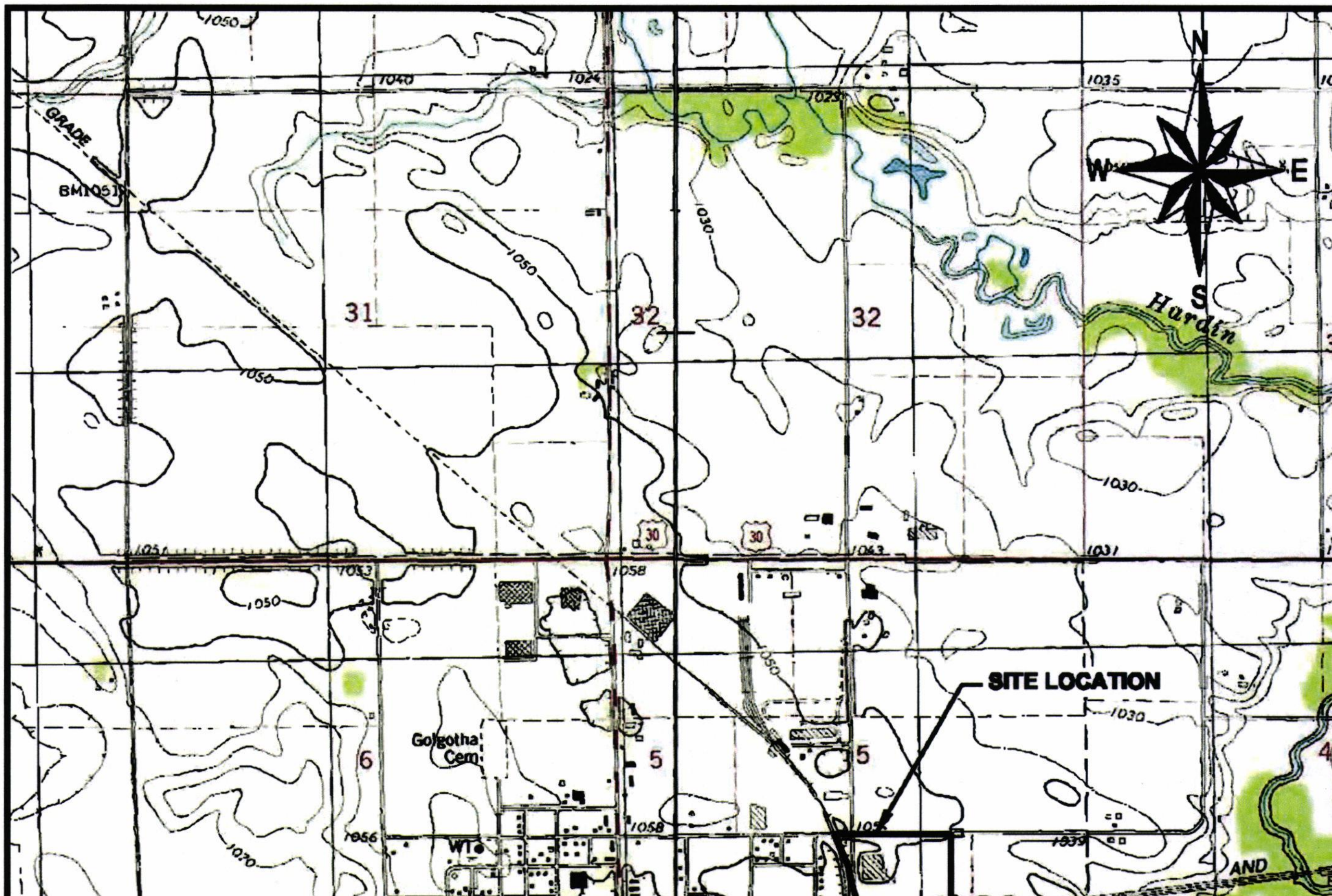
Heckel, P.H., 1994, Evaluation of evidence for glacio-eustatic control over marine Pennsylvania cyclothems in North America and consideration of possible tectonic effects: in Tectonic and Eustatic Controls on Sedimentary Cycles: Dennison, J.M. and Ettensohn, F.R., eds. SEPM Concepts in Sedimentology and Paleontology #4, p. 65-87.

Pope, J., Witzke, B, Ludvigson, G, Anderson, R., Bedrock Geologic Map of South-Central Iowa, Iowa Department of natural Resources, Iowa Geological Survey, July 2002.

Ravella, et al, 2007, "Application of the Membrane Interface Probe (MIP) to Delineate Subsurface DNAPL Contamination", The Environmental Engineer – Volume 1, Winter 2007.

US Department of Natural Resources, Natural Resources Conservation Services, Greene County, Iowa, Version 15, November 25, 2009, http/websoilsurvey.sc.egov.usda.gov/.

FIGURES



REFERENCE

1.) BASE MAPS TAKEN FROM USGS MAP TITLED, "EAST JEFFERSON, IOWA" AND "WEST JEFFERSON, IOWA" DATED 1986.

2000 0 2000

SCALE APPROXIMATE FEET

Golder Associates
Manchester, New Hampshire

SCALE	AS SHOWN
DATE	01/19/2012
DESIGN	JSP
CADD	MPB
CHECK	JSP
REVIEW	APTM

FILE No. 10387305E001

PROJECT No. 103-87305 REV. 0

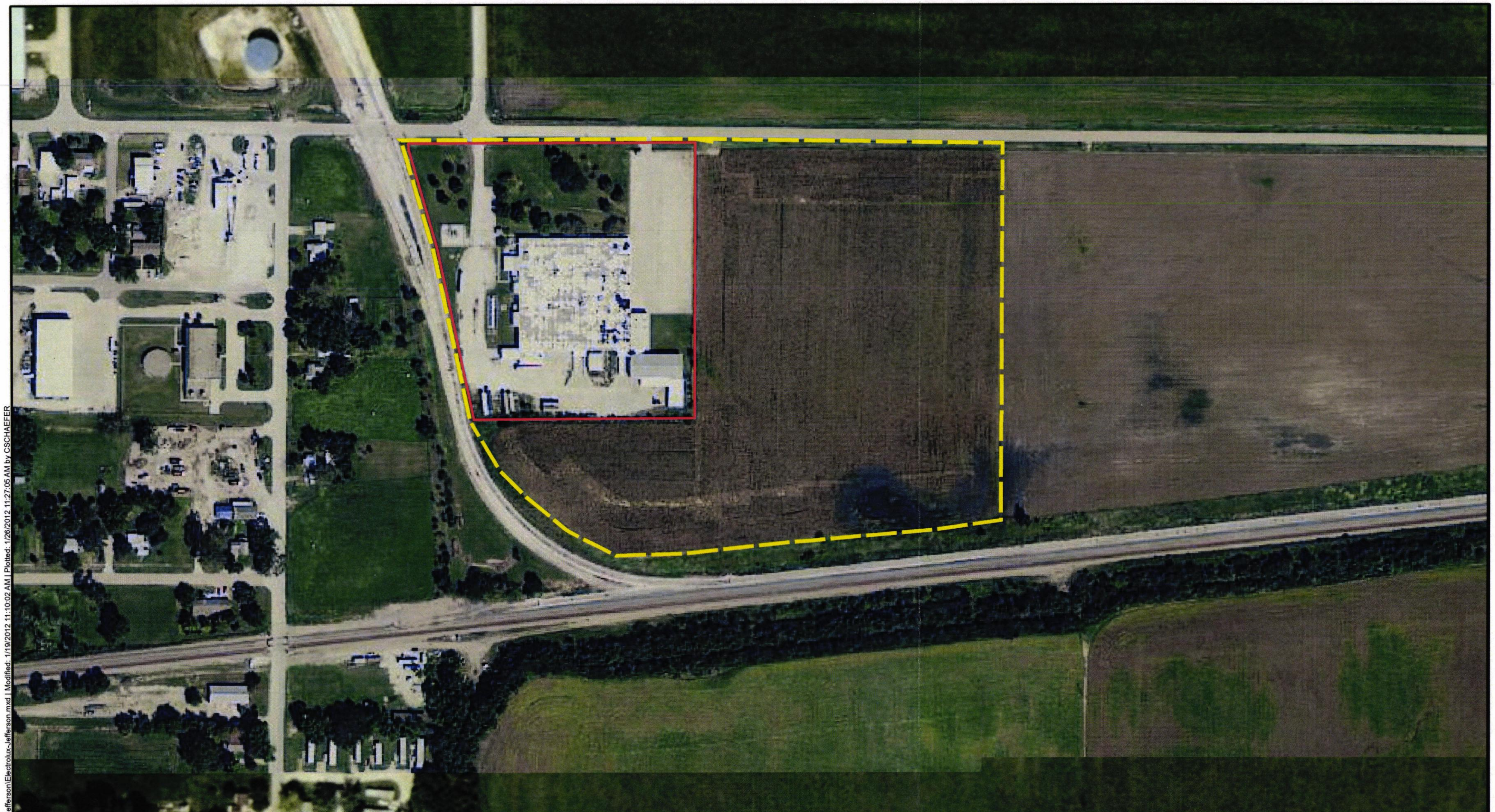
TITLE

SITE LOCATION MAP
601 EAST CENTRAL ST.
JEFFERSON, IOWA

ELECTROLUX JEFFERSON, IOWA

FIGURE 1

Drawing file: 10387305E001.dwg Jan 26, 2012 - 10:40am



LEGEND

- Approximate Site Property Boundary
- Former Manufacturing Area

REFERENCES

1. Imagery of Jefferson Iowa taken from the United States Department of Agriculture - Farm Service Agency, 2009 National Agriculture Imagery Program. Photo Date: 2010.

2. North American Datum 1983 Iowa State Plane North in Feet

FIGURE NARRATIVE

This figure shows the approximate site property boundary and developed portion of the site. The site property boundary is an approximation and has not been surveyed by a licensed surveyor.

0 100 200 400 Feet

1 inch = 200 feet

N

Golder Associates
Manchester, New Hampshire

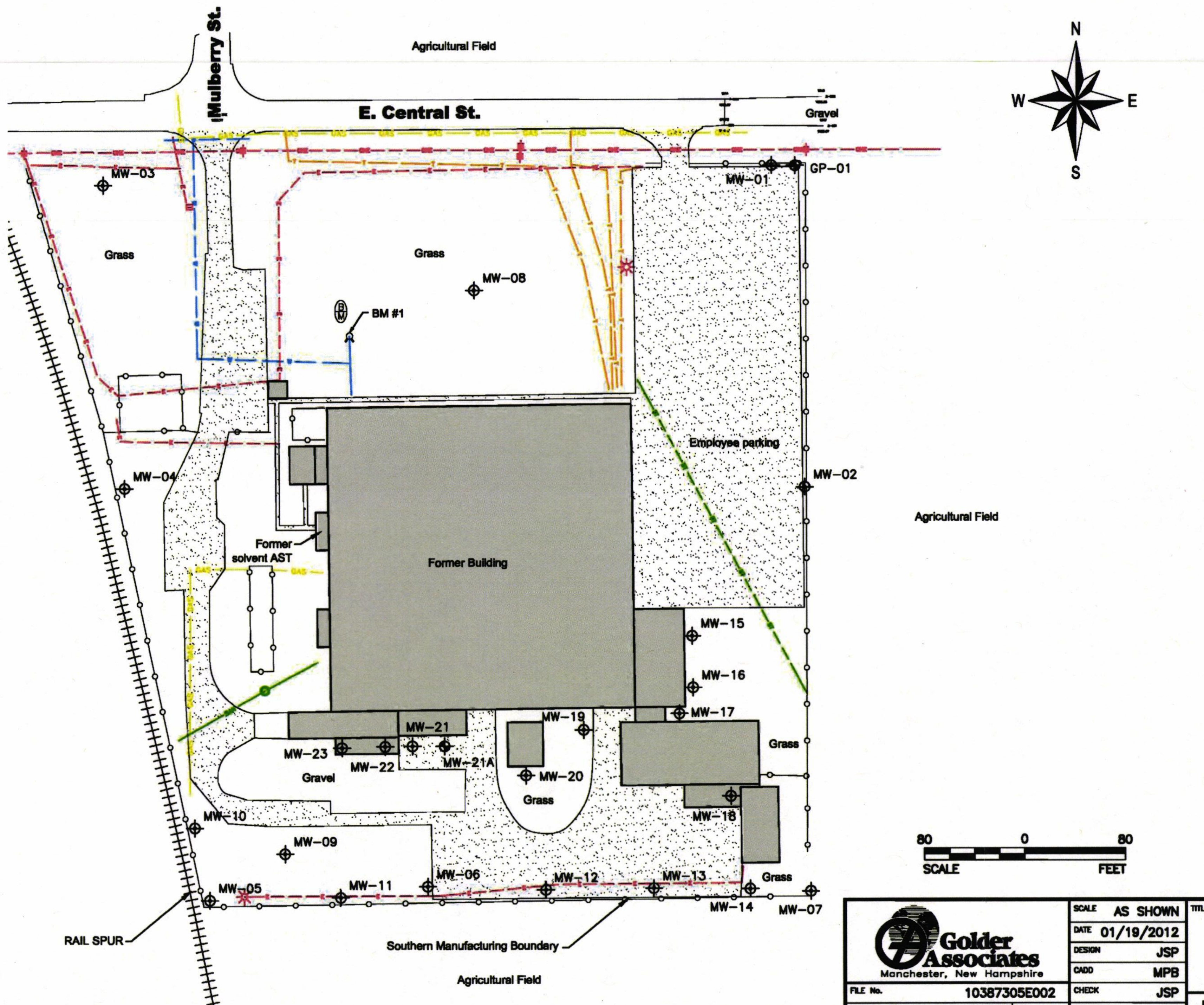
SCALE	AS SHOWN		
DATE	01/19/2012		
DESIGN	CDS		
GIS	CDS		
FILE No.	Electrolux_Jefferson	CHECK	JSP
PROJECT No.	103-87305 REV. 0	REVIEW	APTM

Site Vicinity Map

Electrolux Home Products - Jefferson, IA

FIGURE 2

Map: V:\001 GIS Projects\2010\electrolux_Jefferson\Electrolux-Jefferson.mxd | Modified: 1/19/2012 11:10:02 AM | Plotted: 1/26/2012 11:27:05 AM by CSCHAEFER



LEGEND

	Fence
	Edge gravel
MW-01	Monitoring well location
GP-01	Boring location
	Building
	Bench mark
	Telephone line
	Water line
	Overhead electrical line
	Electrical line
GAS	Gas line
SAN	Sanitation line
ST	Storm drain line
	Former Building (slab remains)
	Concrete/pavement

NOTES

1.) BM #1 elev. = 1052.49 (NAVD 88) center top non-operating bolt on fire hydrant Northwest of main building.

2.) JEO consulting group did not find useful NGS monuments in the Jefferson area. A USGS 24,000k Topographic map elevation (1054.00) at the intersection of Mulberry Street and East Central Street as the assumed NAVD 88 elevation. This elevation agreed with the elevation generated from Geoid-09.

3.) The coordinates for this site are approximate Iowa State Plane North 1401 with a ground scale factor of 1.0000463418.

REFERENCES

1.) Basemap taken from JEO Consulting Group, Inc. drawing titled, "Electrolux Home Products base map", dated 11/21/10.

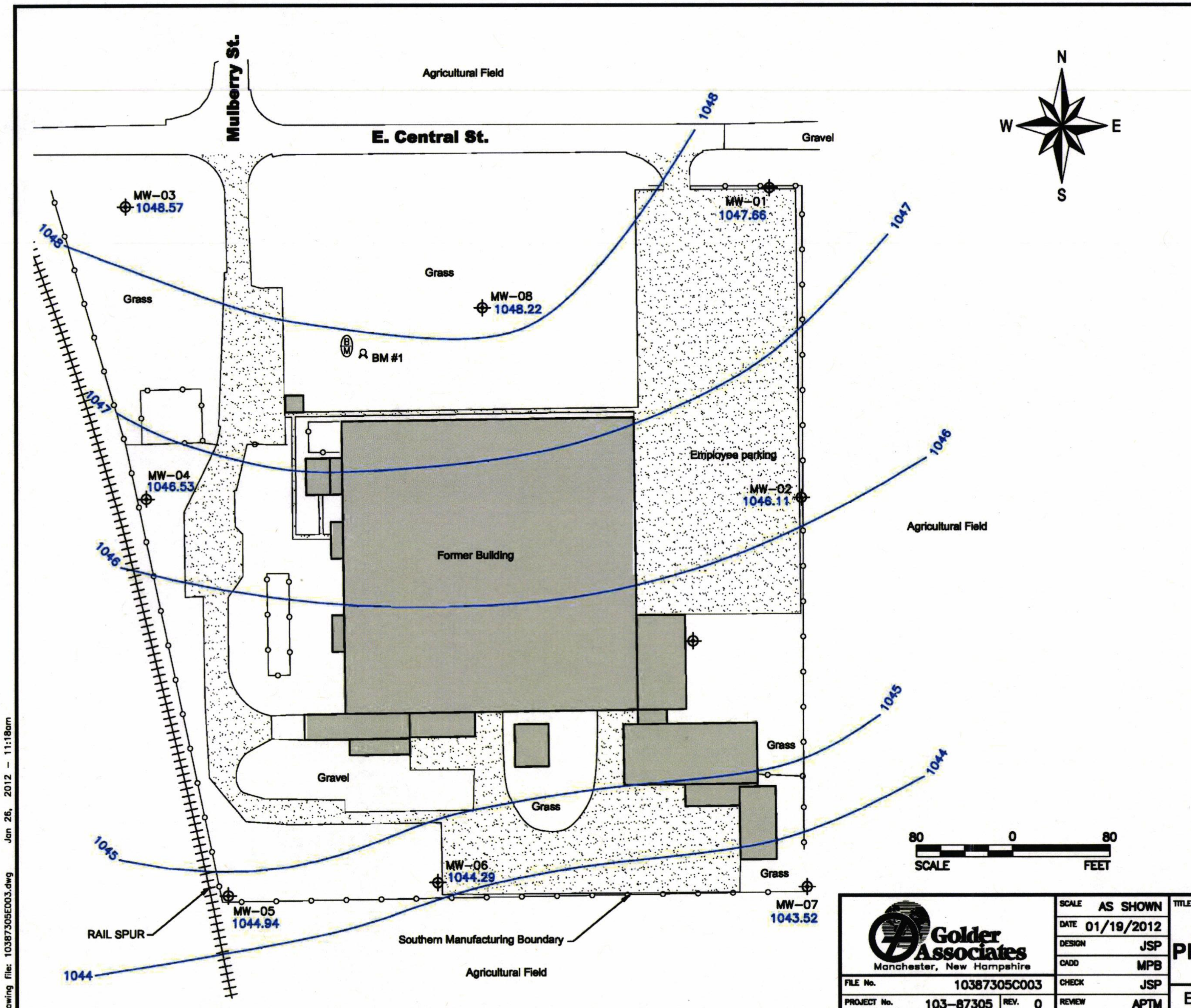
FIGURE NARRATIVE

This figure shows the former site buildings, boring, and monitoring well locations and utilities at the former Electrolux manufacturing facility located in Jefferson Iowa.

Golder Associates
Manchester, New Hampshire

SCALE	AS SHOWN	TITLE		
DATE	01/19/2012	SITE MAP		
DESIGN	JSP			
CADD	MPB			
FILE No. 10387305E002	CHECK	JSP		
PROJECT No. 103-87305 REV. 0	REVIEW	APTM	ELECTROLUX / JEFFERSON, IOWA	FIGURE 3

Drawing file: 10387305E002.dwg Jan 26, 2012 - 11:15am



LEGEND

- Interpreted Phreatic surface contour (NGVD 88)
- Fence
- Edge gravel
- Building
- MW-01 1047.66 — Monitoring well location and groundwater elevation (Ft. NGVD.)
- GP-01 — Boring location
- Bench mark
- Former Building (slab remains)
- Concrete/pavement

NOTES

1.) BM #1 elev. = 1052.49 (NAVD 88) center top non-operating bolt on fire hydrant Northwest of main building.

2.) JEO consulting group did not find useful NGS monuments in the Jefferson area. A USGS 24,000k Topographic map elevation (1054.00) at the intersection of Mulberry Street and East Central Street as the assumed NAVD 88 elevation. This elevation agreed with the elevation generated from Geoid-09.

3.) The coordinates for this site are approximate Iowa State Plane North 1401 with a ground scale factor of 1.0000463418.

REFERENCES

1.) Basemap taken from JEO Consulting Group, Inc. drawing titled, "Electrolux Home Products base map", dated 11/21/10.

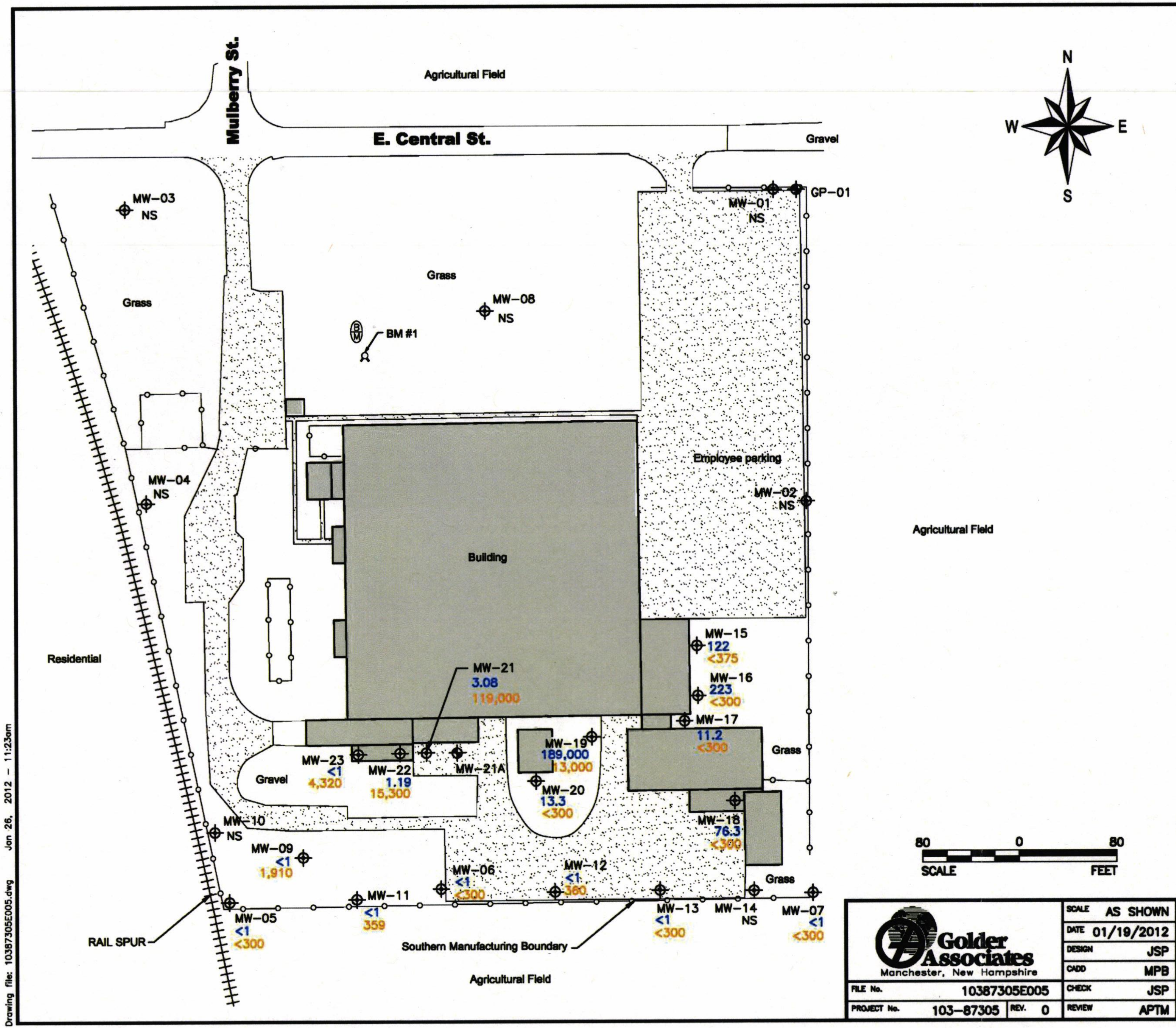
FIGURE NARRATIVE

This figure depicts the groundwater elevation, as measured in shallow groundwater monitoring wells, and is intended to represent the approximate elevation of the groundwater table (phreatic) surface. The posted data were calculated from depth to water measurements made by Golder on March 28, 2011 from wells screened across or near the water table. The direction of horizontal groundwater flow at and near the phreatic surface can be generally interpreted as being perpendicular to the groundwater elevation contours.

Golder inferred the elevation contours based on the data illustrated. The actual elevation of the groundwater table (phreatic) surface is likely more heterogeneous than shown and actual conditions will vary. Other interpretations are possible. The depth to groundwater is known to vary with time.

Golder Associates, Manchester, New Hampshire	SCALE AS SHOWN	TITLE	
	DATE 01/19/2012	INTERPRETED MARCH 2011 PHREATIC SURFACE CONTOUR MAP	
	DESIGN JSP		
	CADD MPB		
FILE No. 10387305C003	CHECK JSP		
PROJECT No. 103-87305 REV. 0	REVIEW APTM	ELECTROLUX / JEFFERSON, IOWA	FIGURE 4

Drawing file: 10387305E003.dwg Jan 26, 2012 - 11:18am



LEGEND

	Fence
	Edge gravel
MW-01	Monitoring well location
12.3 TCE	Trichloroethylene results (ug/L)
<300 TEH	Total extractable hydrocarbon results (ug/L)
NS	No sample collected
GP-01	Boring location
	Building
	Bench mark
	Former Building (slab remains)
	Concrete/pavement

NOTES

1.) BM #1 elev. = 1052.49 (NAVD 88) center top non-operating bolt on fire hydrant Northwest of main building.

2.) JEO consulting group did not find useful NGS monuments in the Jefferson area. A USGS 24,000k Topographic map elevation (1054.00) at the intersection of Mulberry Street and East Central Street as the assumed NAVD 88 elevation. This elevation agreed with the elevation generated from Geoid-09.

3.) The coordinates for this site are approximate Iowa State Plane North 1401 with a ground scale factor of 1.0000463418.

4.) There are buried utilities on the Electrolux property. The contractor shall notify the respective utility companies before commencing and subsurface work. Neither the owner nor engineer assumes any responsibility for utility locations being accurately shown, or not shown on the plan.

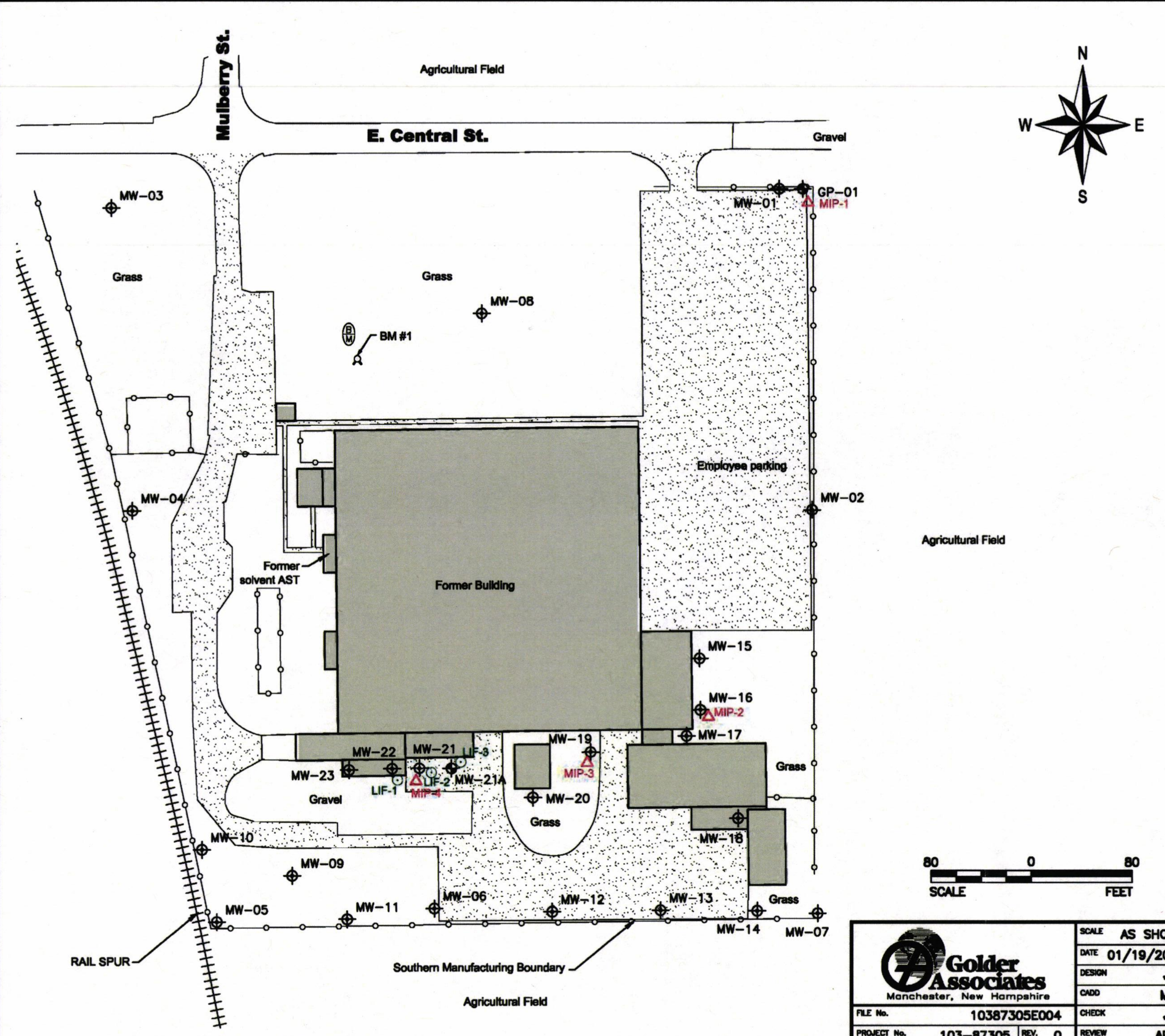
REFERENCES

1.) Basemap taken from JEO Consulting Group, Inc. drawing titled, "Electrolux Home Products base map", dated 11/21/10.

FIGURE NARRATIVE

This figure shows a generalized depiction of the relative distribution of trichloroethene (TCE) in shallow groundwater and total extractable hydrocarbons (TEH) downgradient of the former manufacturing building. The posted data are for groundwater samples collected in April 2011 from wells screened across or near the water table. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. The TCE and TEH distribution in groundwater may vary with time.

Golder Associates, Manchester, New Hampshire	SCALE: AS SHOWN	TITLE: APRIL 2011 TRICHLOROETHENE AND TOTAL EXTRACTABLE HYDROCARBON GROUNDWATER DISTRIBUTION MAP	
	DATE: 01/19/2012		
	DESIGN: JSP		
	CADD: MPB		
FILE No.: 10387305E005	CHECK: JSP		
PROJECT No.: 103-87305 REV.: 0	REVIEW: APTM	ELECTROLUX / JEFFERSON, IOWA	FIGURE: 5



LEGEND

- Fence
- Edge gravel
- MW-01 Monitoring well location
- GP-01 Boring location
- Proposed initial LIF probe location
- Proposed initial MIP probe location
- Building
- Bench mark
- Former Building (slab remains)
- Concrete/pavement

NOTES

LIF = Laser-induced fluorescence

MIP = Membrane interface probe

REFERENCES

1.) Basemap taken from JEO Consulting Group, Inc. drawing titled, "Electrolux Home Products base map", dated 11/21/10.

FIGURE NARRATIVE

This figure shows the initial MIP/LIF probe locations. The number, location, and the depth of additional probes will be modified as appropriate, based on assessment observations and results. Golder will determine the confirmatory soil borings and monitoring well installation locations based on the screening assessment data.

Golder Associates, Manchester, New Hampshire		SCALE	AS SHOWN
		DATE	01/19/2012
		DESIGN	JSP
		CADD	MPB
FILE No.	10387305E004	CHECK	JSP
PROJECT No.	103-87305 REV. 0	REVIEW	APTM

TITLE

APPROXIMATE PROPOSED MIP AND LIF PROBE LOCATIONS

ELECTROLUX / JEFFERSON, IOWA

FIGURE 6

Drawing file: 10387305E004.dwg Jan 26, 2012 - 11:21am

APPENDIX A
STANDARD OPERATION PROCEDURES

FIELD METHODS AND STANDARD OPERATING PROCEDURES
FORMER ELECTROLUX FACILITY
JEFFERSON, IOWA

January 2012

Project No.: 103-87305

TABLE OF CONTENTS

List of Attachments

1.0 STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOPs) are instructions that an individual or organization follow to document routine or repetitive field or office activities. The development and use of SOPs are an integral part of a successful quality system as SOPs provide individuals with information to perform work properly, and facilitate consistency in the quality and integrity of work products and results. The proper use and execution of SOPs reduces variation and promotes quality through consistent implementation of a process or procedure, even in cases of temporary or permanent personnel changes.

1.1 SOP-1 Utility Clearance Procedures

The purpose of this SOP is to describe the methods for clearing utility locations on Site. The scope of this document is limited to field operations and protocols applicable during advancement of soil borings, monitoring well installation, Membrane Interface Probes (MIP) and Laser-Induced Fluorescence (LIF) probes. Based on a review of utility maps for the Site, Golder anticipates that buried water, sewer, stormwater, natural gas, electrical, and communication lines may exist in the proposed investigation areas. However, during the demolition activities in 2011, all the utility lines were turned off at the street, except the water supply which is scheduled to be disconnected by the City of Jefferson in Spring 2012, and should not pose a risk to Site personnel (i.e., will not be energized, pressurized, or full).

Responsibilities

Golder will be responsible to oversee the utility clearance procedures to reduce the potential for encountering a utility during the subsurface assessment activities. Field personnel are required to follow this SOP and adhere to utility mark out locations.

Procedures

The utility locating procedures will include:

- Contacting Iowa One Call to clear utilities within the public right-of-ways. Golder personnel will use the Iowa One Call clearance field form (Attachment A) to record the Iowa One Call ticket number and list the utilities contacted by Iowa One Call. Iowa One Call does not contact local utilities including municipal water and sewer companies. Golder will be responsible for contacting the local utility companies. Utility color coding for Iowa One Call companies include:

RED	Electric power lines, cables or conduits, and lighting cables.
YELLOW	Gas, oil, steam, petroleum or other hazardous liquid or gaseous materials.
ORANGE	Communications, cable TV, alarm or signal lines, cables, or conduits.
BLUE	Water, irrigation, and slurry lines.
GREEN	Sewers, storm sewer facilities, or other drain lines.
WHITE	Proposed excavation
PINK	Temporary survey markings.
PURPLE	Reclaimed water, irrigation and slurry lines.

- Review existing Site utility maps
- Advance the boring outside the area of a marked utility

1.2 SOP-2 Field Log Book and Field Form Procedures

The field log book provides a means to record daily significant events, observations, and measurements during sampling and monitoring activities. Sufficient data and observations shall be recorded in the field log book and/or field forms to enable reconstruction of field events.

Responsibilities

It is the responsibility of the Field Team Leader to maintain centralized daily records of all significant field events, observations, and measurements during field assessment activities. Members of the field team are responsible for maintaining complete records of their actions, observations, etc., in the field log books and providing this information to the Field Team Leader at the end of each day. If observations and measurements are taken in an area where the field log book may become contaminated or if the field personnel are spread over a large area, separate waterproof bound and numbered field log books may be maintained. The Field Team Leader will make photocopies of all field data entries on a regular basis (preferably at the end of each day but at least on a weekly basis) and submit the copies to the Project Manager for inclusion with the project file. The entries shall be signed and dated at the completion of each task or at the end of each day. The field team members will retain the individual field log books until the logbook is filled or the completion of the project, at which time possession of the log books is transferred to the Project Manager. The Project Manager and/or Field Team Leader are responsible for collecting the forms and entering them into the project file. Field personnel are responsible for assuring that forms are completed in waterproof ink.

If an individual makes an error while filling out the log book, a line shall be drawn through the error and the correction entered. Individual pages, which will be sequentially numbered, shall not be removed from bound log books.

Equipment Description

- A waterproof, bound field log book
- A waterproof, bound sample log book
- A waterproof ink pen

1.2.1 Field Log Book

The Field Team Leader and field staff are responsible for logging dates, times, subcontractors, field personnel, field activities, field observations, and any other pertinent information during field activities. Field log book entries shall be legible and include, at a minimum, the following information:

- Date
- Project name and number
- Weather and temperature
- List of personnel present including subcontractors and visitors. The time of arrival and departure shall be noted next to each name
- Name and times of visit by unauthorized personnel to the site
- Business phone calls along with the name of the field personnel making the call and the phone call recipient, time, and a brief description of the topic of conversation
- A description of the activities of subcontractors (e.g., drillers, backhoe contractor, survey contractor, etc.) and subcontractor down-time. Next to the entry, note the reason for the down-time. Log information or observations regarding the subcontractor's performance in the field log book
- Description of all field activities completed including soil boring advancement, monitoring well installation and sampling activities, MIP/LIF surveys including all measurements
- The time of any photographs taken along with the direction and descriptions of the photographs and weather conditions

If page numbers are not pre-printed in the field log book, sequential page numbers shall be written at the top of each page.

1.2.2 Equipment Calibration Forms Procedures

Equipment calibration forms are required to record and track daily calibration of each instrument. The equipment manual provides instructions on proper calibration procedures. Information to be recorded shall include the following:

- Date and time of calibration
- Equipment calibrated with model number and/or identification number
- Media used to calibrate instrument (e.g., solutions or gas)
- Calibration media information, lot numbers, and concentration
- Pre- and post-calibration readings

Follow the provided instructions and record the necessary information on the calibration field forms (Attachment B and C). Field personnel will provide the original Calibration Forms to the Project Manager, for inclusion in the office project files.

1.2.3 Groundwater Sample Collection Field Form Procedures

Information collected during the groundwater sampling shall be recorded on groundwater sample collection field forms and field log books, as appropriate. The groundwater sample collection field form (Attachment D) provides a record of the sampling methods and equipment, monitoring well information, and chemical analyses performed. The field sampling records should accurately document field sampling procedures and data collection. Because sampling procedures may alter the chemical results, documenting sampling process is an important part of verifying the integrity of the samples. The following information shall be recorded in the groundwater sample collection form:

- Date and time of purging and sampling
- Sampling location designations
- Depth to water
- Total depth of well
- Standing water column
- Well inside diameter
- Volume of standing water in well
- Purging and sampling device
- Purge volume
- Sample time
- Field observations such as odor, color, and apparent turbidity
- Field water quality data including pH, Eh, specific conductivity, temperature, and dissolved oxygen
- Chemical analyses requested
- Number of samples provided for each laboratory analysis

The groundwater sample collection field forms shall be legible, dated, and signed by the person making the entry. Field personnel will provide the original groundwater sample collection forms to the Project Manager, for inclusion in the office project files.

1.2.4 Soil Boring and Monitoring Well Installation Logging Procedures

Information collected during advancement of soil borings and installation of monitoring wells shall be recorded on soil borings and monitoring well logs, as appropriate. The soil boring and well installation log (Attachment E) provides a record of boring advancement methods and equipment, lithology, site and decontamination procedures, field screening readings, chemical analyses performed, well construction methods, and well completion information (e.g., depth of well). These boring logs are intended to provide accurate descriptions of the lithology and sampling procedures to ensure the integrity of the samples. The following information shall be recorded in the soil boring and well installation log:

- Date and start/end time of boring advancement
- Type of equipment used and drillers name and company information
- Lithologic descriptions including lithology (i.e., Unified Soil Classification System), color, texture, moisture, and weathering
- Field screening readings
- Sampling depth and designations
- Depth to water
- Total depth of boring
- Well installation methods, if required
- Well materials, if required
- Boring diameter

The soil boring and well installation logs shall be legible, dated, and signed by the person making the entry. Field personnel will provide the original soil boring and well installation log to the Project Manager, for inclusion in the office project files.

1.2.5 MIP and LIF Logging Procedures

Information collected during advancement of the MIP and LIF probes shall be recorded on logs, as appropriate. The MIP and LIF logs (Attachment F and G) provides a record of probe advancement methods, probe identification, file name, trip time, final depth, and response calibration records.

1.3 SOP-3 Sample Identification Procedures

Field personnel will label each MIP, LIF probe, and soil and groundwater sample with a unique sample identification (ID) which reflects the sample location, type of sample collected, and sample depth, as applicable. Each sample label and container will also be marked with the Site name, data and time of sample collection, analysis to be performed (e.g., EPA Method 8260B), and any relevant sample preservative used (e.g., HCL).

The specific sample IDs for each sampling type will be as follows:

<u>MIP</u> MIP-XX; where MIP indicates Membrane Interface Probe and XX represents the sample probe identification. The MIP sample IDs will be noted in the field log book, MIP field log (Attachment F), and on the MIP log output generated by the instrumentation.

<u>LIF</u> LIF-XX; where LIF indicates Laser-induced Fluorescence and XX represents the sample probe identification. The LIF sample IDs will be noted in the field log book, (Attachment G), and on the LIF log output generated by the instrumentation.

Soil Borings SB-XX BB-EE; where SB indicates soil boring sample, XX represents the sample location, BB indicates the beginning of the sample interval and EE indicates the end of the sample interval. The beginning and ending sample intervals shall be noted in the units of feet.

Groundwater MW-XX; where MW indicates a monitoring well and XX represents the monitoring well ID.

1.4 SOP-4 Equipment Decontamination Procedures

This SOP describes the methods for decontaminating equipment and tools used during the assessment activities. The scope of this SOP is limited to field operations and protocols applicable during advancement of soil borings, monitoring well installation, MIP, LIF probes, and sampling equipment.

1.4.1 Decontamination Equipment and Solutions

Specifications for standard cleaning materials include:

- Soap shall be a phosphate-free laboratory detergent such as Liquinox® or Alconox®. Use of other detergent must be justified and documented in the field log books and investigative reports.
- Solvent shall be pesticide-analysis grade isopropanol. Use of a solvent other than pesticide-analysis grade isopropanol for equipment cleaning purposes must be justified and documented in field logbooks and assessment reports.
- Tap water may be used from any municipal water system. Use of an untreated potable water supply is not an acceptable substitute for tap water.
- Analyte free water (distilled water) is tap water that has been treated with activated carbon and a standard deionizing resin column. At a minimum, the finished water should contain no detectable heavy metals or other organic or inorganic compounds (i.e., at or above analytical detection limits).
- Nitric Acid shall be trace-metal analysis grade or better. Nitric acid used to decontaminate non-dedicated soil sampling equipment, shall be a one percent solution.
- Other solvents may be substituted for a particular purpose if required. For example, removal of concentrated waste materials may require the use of either pesticide-grade hexane or petroleum ether. After the waste material is removed, the equipment must be subjected to the standard cleaning procedure. Because these solvents are not miscible with water, the equipment must be completely dry prior to use.

Field personnel shall collect solvents, laboratory detergent, and rinse waters used to clean equipment and store these liquids in DOT-approved 55-gallon drums for proper off-Site disposal (see Investigation Derived Waste – Section 1.9).

1.4.2 Sampling Equipment Decontamination Procedures

Field personnel will use the procedures in this section to decontaminate all non-dedicated sampling equipment (e.g., stainless steel bowls and spoons) to collect and/or homogenize soil samples. The procedures include:

1. Clean with tap water and soap using a brush to remove particulate matter and surface films

2. Rinse thoroughly with tap water
3. Rinse thoroughly with distilled water
4. Rinse with dilute (one percent) trace-metal analysis nitric acid if performing metal analysis
5. Rinse with distilled water
6. Allow to air dry
7. Wrap equipment in aluminum foil until needed for sampling

1.4.3 Field Water Quality Meter and Water Level Meter Decontamination Procedures

Field personnel will use the procedures in this section to decontaminate all non-dedicated monitoring equipment (e.g., field water quality meter and water level meter) to collect field water quality measurements. The procedures include:

1. Rinse thoroughly with distilled or deionized water prior to each use.
2. If Non-Aqueous Phase Liquid (NAPL) is observed, field personnel will use an Alconox water solution, scrub the meter with a brush, and use a double rinse the meter with distilled water.

1.4.4 Drill Rig, Tool, and Well Material Decontamination Procedures

The drilling contractor will use the procedures in this section to decontaminate the drill rig, MIP, LIF, and drilling tools used to advance the soil borings. The procedures include:

1. The driller shall construct a decontamination pad to collect solids and liquids generated during the decontamination process. Thoroughly pressure steam-clean the drill rig and tools (e.g., macro core sampler) upon arrival on Site over a dedicated decontamination pad.
2. The driller will decontaminate downhole tools (e.g., MIP and LIF) between each boring location using an Alconox water solution and a distilled water rinse. If gross contamination (e.g., petroleum sheen) is observed on the downhole tools, the driller will pressure steam-clean the equipment.
3. During well installation, the driller must use a new pair of disposal vinyl or latex gloves while handling the well materials.
4. Well materials used on Site must be new and wrapped in plastic.

1.5 SOP-5 Chain-of-Custody Procedures

The intent of this SOP is to provide guidance to maintain sample integrity. The chain-of-custody form provides evidence and documentation of sample collection, shipment, laboratory receipt, and laboratory custody until disposal of the sample. The chain-of-custody form identifies each sample collected and the individuals responsible for sample collection, shipment, and receipt.

<u>Responsibilities</u>

Field personnel who collect the samples are responsible to initiate the chain-of-custody protocol. Upon sample collection, but prior to storage, shipment, or transportation, field personnel shall properly and completely fill out the chain-of-custody form with a waterproof ink pen. The Field Team Leader shall review the form prior to sample storage, shipment, or transportation. If an individual makes an error during the completion of the chain-of-custody form, a line shall be drawn through the error and the correction entered. Field personnel completing the form shall initial and date the error. Under no circumstances is white-out or erasing acceptable. Field sampling personnel are responsible for making a copy of the completed chain-of-custody form and giving the form to the Project Manager. The Project Manager or designee shall review the form and place it in the project file with the field sampling forms. Upon receipt by the laboratory, the laboratory sample custodian shall assume responsibility for completing the chain-of-custody procedures. Upon completion of analysis, the laboratory shall submit a copy of the completed chain-of-custody form with the analytical data to the Project Manager who will place it in the project file.

Equipment Description

- Chain-of-custody forms
- A waterproof ink pen

Procedures

Field personnel shall use a waterproof ink pen to complete the chain-of-custody forms. Preparation of the chain-of-custody form includes:

- Complete the chain-of-custody form by entering the project name, client name, laboratory name and address, the person to whom the chemical analyses results shall be reported, and invoicing information at the top of the form.
- Sample-specific information shall include the field identification number, the date and time the sample is collected, the depth at which the sample was taken, the type of sample (e.g., groundwater, soil, etc.), the type of analyses requested, and preservatives used. Samples shall be grouped for shipment with other samples for similar analysis and use a common form. More than one chain-of-custody form shall be used if the number of samples placed in a cooler is greater than the number of entry spaces on the chain-of-custody form.
- Each person taking possession of the samples shall sign and date the chain-of-custody both as a recipient and as a relinquisher of the samples. When the samples are delivered to the laboratory, the laboratory sample custodian will sign the chain-of-custody as the last recipient of the samples.
- If the samples are directly transported to the laboratory, the chain-of-custody shall be kept in the possession of the person delivering the samples. Upon receipt by the laboratory, the sample receiver(s) shall open the shipping containers, compare the contents with the chain-of-custody form, assign laboratory sample identification number(s), record the laboratory sample identification number on the chain of custody, and sign and date the form. Any discrepancies shall be noted on the chain-of-custody form and the Project Manager notified immediately.
- Prior to shipment by a commercial carrier, make a copy of the chain-of-custody form. If the samples are delivered directly to the laboratory by field personnel, a copy of the form shall be made after the laboratory representative signs and dates the chain-of-custody form.
- Chain-of-custody forms shall be maintained with the analytical data.

1.6 SOP-6 Quality Assurance/Quality Control (QA/QC) Samples

Golder will collect various quality assurance/quality control (QA/QC) samples during the assessment activities. QC samples are used to monitor sampling and laboratory performance and include trip blanks and field replicates. Each of these QA/QC samples is summarized below.

Trip Blanks

Trip blanks are used to verify that the VOC bottles and samples are not contaminated in transit between the lab to the Site, while on-Site, and from the Site back to the lab. The lab will supply pre-preserved and pre-prepared trip blanks. Trip blanks shall accompany the VOC samples throughout the event from collection through shipment to the laboratory and are recorded on the Chain-of-Custody along with the primary samples. A trip blank shall be shipped with each cooler that contains VOC samples.

Field Replicates

Field replicates are collected to assess the laboratory equipment accuracy. Field replicates shall be collected for all required analyses at a frequency of not less than 10% of the total number of primary samples collected. Field replicates shall be collected by sampling the same location twice. However, the field replicate is assigned a unique sample identification number, which does not identify the sample location. The field replicate samples will be designated Duplicate-XX, where XX stands for the duplicate number. The duplicate sample IDs and location will be noted in the field log book and on the chain-of-custodies, as applicable.

Golder will collect field replicate samples by alternating primary and field replicate sample bottles during sample collection. Field replicates are recorded on the Chain-of-Custody along with the primary samples.

1.7 SOP-7 Soil Boring and Soil Sampling Procedures

Soil Boring Area Preparation

Prior to any sub-grade soil sampling, the Field Team Leader or his/her designee will perform the utility clearance in accordance with the Utility Clearance Procedures SOP presented in Section 1.1.

1.7.1 Soil Borings Procedures

Soil borings will be advanced using a track-mounted Geoprobe® Direct Push Technology (DPT) rig, which will push and pneumatically hammer a soil boring to the target depth. The driller will collect continuous five-foot long soil samples from the ground surface (or approximate base of the asphalt or concrete pavement) to the bottom of the boring using a Geoprobe® steel macro-core sampler with dedicated inner polyethylene sleeves. After removal of the macro-core sampler from the ground, the driller will extract the dedicated inner polyethylene sleeve with the soil core from the steel sampler and cut the polyethylene tube lengthwise to expose the soil core for logging (see Section 1.2.4) and collection of field screening and/or laboratory samples (see Section 1.3).

Field personnel shall screen the soil samples for the presence of volatile organic compounds (VOCs) using a Photovac MiniRae 2000 organic vapor analyzer (OVA) or equivalent equipped with a photoionization detector (PID). Subsequent to the soil OVA screening results, field personnel will collect soil samples for laboratory analyses at the interval with the highest OVA reading, from the interval with visual or olfactory indication of a release, and/or from the interval identified by the MIP/LIF assessment as having impacted soil. Field personnel will record the field OVA readings and lithologic descriptions in the boring logs (see Attachment E).

1.7.2 Soil Sampling Procedures

Field personnel will collect soil VOC samples using laboratory-provided TerraCore™ sampling equipment (plastic plunger) or equivalent in accordance with the following procedures:

- Upon determining the sample interval, collect three (3) TerraCore™ samples within a six inch interval and place the soil sample (five-milliliters) into two sodium bisulfate laboratory preserved bottles and one methanol laboratory preserved bottle (preservation Method 5035).
- Fill the plastic plunger with an additional five milliliter sample and place the plastic cap over the filled plunger for use in measuring soil moisture.
- Following sample collection, place the sample containers on ice in a cooler, maintain the cooler at approximately 4° Celsius (C), and transport the cooler by overnight courier to the laboratory.

Field personnel will log the samples on a chain-of-custody form, which is kept with the samples (see Section 1.5). Maintain chain-of-custody procedures throughout the sampling and transportation process.

Field personnel will collect non-VOC soil samples using stainless steel bowls and spoons or dedicated sample containers per the analytical method requirements. Non-dedicated sampling equipment will be decontaminated prior to sampling in accordance with the Decontamination SOP (see Section 1.4). Field personnel will containerize the decontamination water, un-used cores, and solids in accordance with Investigation-Derived Waste procedures (see Section 1.9).

1.8 SOP-8 Groundwater Sampling Procedures

Groundwater samples shall be collected using the following equipment and procedures:

1.8.1 Sampling Equipment Description

Reusable and expendable equipment and materials required for groundwater sampling includes, but may not be limited to:

Reusable:

- Peristaltic pump
- YSI 600XL flow-through cell or equivalent field water quality meter
- Dissolved oxygen (DO) meter
- Electric groundwater level monitoring meter graduated in increments of 0.01 feet
- Groundwater Collection Form – an example of this form is included as Attachment D
- First-aid kit – present on-Site at all times
- Fire extinguisher – present on-Site at all times
- Site and monitoring well keys
- Calculator

Expendable:

- VOC sample containers - three 40-milliliter (mL) glass sample containers (vials) for each VOC sample. The sample bottles will either be newly purchased, certified by the laboratory, and pre-preserved with hydrochloric acid (HCL)
- TEH sample containers – one, one-liter amber bottle for each TEH sample. The sample bottles will be newly purchased, certified by the laboratory, and be unpreserved as required by the analytical method
- Coolers and ice – The laboratory will provide the coolers. Field sampling personnel will purchase ice as necessary to maintain sample temperatures less than 4°C
- Latex or Nitrile gloves as appropriate – purchased by the sampler as needed
- Alconox®/Liquinox® (mild detergent) – purchased by the sampler as needed
- Distilled water – purchased by the sampler as needed
- Dedicated Teflon-lined polyethylene and silicon tubing

1.8.2 Purging and Sampling Procedures

Groundwater sample collection procedures include:

- Calibrating the YSI 600XL or equivalent field water quality meter in accordance with the manufacturer's recommendations each day prior to collecting groundwater samples and checking the meter calibration at the end of each sampling day (see Attachment C).
- Placing dedicated Teflon-lined polyethylene tubing into the sampling point to the approximate center point of the screened interval. In instances where the screened interval is not completely saturated, place the tubing to the midpoint of the saturated interval.
- Connecting the Teflon-lined polyethylene tubing into the silicon tubing running through the peristaltic pump.
- Connecting the discharge end of the silicon tubing to a second piece of Teflon-lined polyethylene tubing (water discharge tubing).
- Connecting the discharge end of the Teflon-lined polyethylene tubing to the YSI 600XL or equivalent field water quality meter and measuring and recording pH, specific conductance, Eh, and temperature of the purge water. Field personnel will record the field water quality parameters once the flow-through cell is completely full. Do not wait

for stabilization of the field water quality parameters before recording the readings from the field water quality meter.

- Each well will be purged at a rate between approximately 100 to 200 milliliters per minute (ml/min). The water level in the well will be monitored approximately every five minutes during pumping using an electronic water level meter, and ideally the pumping rate should equal the well recharge rate with little or no water level drawdown in the well (ideally less than 0.5 feet). At least one foot of water will be maintained over the intake to reduce the risk of the pump suction being broken, or entrainment of air in the sample.
- During purging, field parameters (temperature, pH, turbidity, specific conductance, ORP and DO) will be monitored with an in-line direct reading instrument (such as a YSI or equivalent flow-through cell). Readings shall be recorded approximately every ten minutes until the parameters have stabilized. Stabilization is considered achieved if pH is within +/- 0.1, conductivity is within 3%, turbidity is within 10% (or is less than 10 NTU), oxidation reduction potential is within +/- 10 mV, and DO is within 10% (or within 0.1 mg/l when the DO is less than 1 mg/l), over three consecutive readings. In the event that one or more of the above field parameters does not completely stabilize after three well volumes have been purged, up to two additional well volumes will be purged for a total of five well volumes. Purging will then be considered complete. Historically, due to slow groundwater recharge rates, some of the wells may go dry during purging activities. If a well goes dry, sampling personnel will wait for the well to recharge and then collect the groundwater samples.
- Following measurement of the field water quality parameters, cut the discharge end of the silicon tubing (just in front of the discharge end of the Teflon-lined polyethylene tubing) and collect groundwater samples for TEH analysis using laboratory-prepared sample containers by allowing the pump discharge to flow gently down the inside of the bottle with minimal turbulence.
- After collecting the non-volatile groundwater samples, turn off the peristaltic pump, remove the tubing from the sample point making sure that the influent end of the tubing does not contact the ground and that the effluent (pump) end remains attached to the pump to prevent loss of sample water from the tubing. Remove the tubing from the pump and collect the groundwater sample directly from the influent end of the tubing by allowing water to slowly drain by gravity into the pre-preserved laboratory VOC sample vials.
- Continue to fill the VOC sample vials until a meniscus forms on the lip of the container.
- Quickly place the plastic cap (containing a Teflon septum) on the container and screw the cap on the container.
- The filled bottle shall be turned upside down and tapped several times to ensure that no air bubbles are present in the sample container.
- If air bubbles are present, reopen the container and add additional sample volume to again achieve a meniscus on the lip of the VOC vial.
- Repeat these steps described above until no bubbles remain in any of the VOC sample vials.
- Following sample collection, the groundwater sample will be placed in a cooler on ice for preservation during shipment to a laboratory for analysis in accordance with Chain-of-Custody SOP.
- Following sample collection, field personnel shall properly discard the equipment in accordance with the IDW Management procedures (Section 1.9).

1.9 SOP-9 Investigation Derived Wastes

The following provides guidance on proper management of investigation-derived waste (IDW) generated during assessment activities.

1.9.1 Soil Cuttings and Decontamination Solids Management

The driller will place soil generated during the advancement of the soil borings and solids generated during the decontamination process (e.g., soils from the drill rig) into Department of Transportation (DOT)-approved 55-gallon drums prior to characterization and proper off-Site disposal. Field personnel will label each drum with a weather-proof marker (e.g., permanent paint marker or equivalent) identifying the contents of the drum (e.g., soil boring location), date of generation, and Electrolux contact information. Drums shall be appropriately stored in accordance with local, state, and federal regulations until the wastes are characterized and appropriately disposed of off Site. The driller will place the 55-gallon drums in a temporary, portable metal storage container unit located on Site.

1.9.2 Purge and Decontamination Water Management

Purge water from monitoring points and water generated during the decontamination process shall be placed in 55-gallon, DOT-approved drums prior to characterization. Drums shall be appropriately stored in accordance with local, state, and federal regulations until the wastes are characterized and appropriately disposed of off Site.

1.9.3 Personal Protective Equipment and Investigation Equipment Waste Management

Personal protective equipment (e.g., latex gloves) and investigation equipment (e.g., used plastic macro-core sample tubes) shall be containerized in a separate 55-gallon drum. Drums shall be appropriately stored in accordance with local, state, and federal regulations until the wastes are characterized and appropriately disposed of off Site.

1.10 SOP-10 Borehole Abandonment Procedures

Given the nature of the overburden materials, Golder anticipates that the MIP/EC, LIF probes, and soil borings will remain open following the removal of the probes and drilling equipment. Field personnel will use the following procedures to decide when the boring/probe needs to be abandoned:

- MIP: If the MIP response indicates significant impacts at a given probe location, the probe hole shall be immediately abandoned as described below. Otherwise, the probe hole shall be abandoned at the end of the day or as otherwise convenient.
- LIF probes: If the LIF response detects NAPL at a given probe location, the probe hole shall be immediately abandoned as described below. Otherwise, the probe shall be abandoned at the end of the day or as otherwise convenient.
- Soil Borings: Because soil borings will be advanced adjacent to the MIP and LIF probe locations to confirm the screening results, MIP and LIF response data will be used as described above to determine whether the borehole shall be immediately grouted upon

completion or whether abandonment can be deferred until otherwise convenient during the work day.

1.10.1 Abandonment Procedures

- Remove the MIP, LIF probe, or macro-core sampler from the borehole.
- Use tremie well decommissioning methods by placing the tremie pipe to the bottom of the borehole and pouring/pumping a cement/bentonite slurry through the tremie pipe while slowly extracting the tremie pipe from the borehole to allow the slurry to fill the borehole to approximately three inches from the ground surface or pavement. If the borehole collapses or if the probe or boring is less than 10 feet below ground surface, the cement/bentonite slurry may be poured from the ground surface.
- Cover the borehole with an orange traffic cone and allow the slurry to settle/harden for approximately one hour.
- Add slurry to the borehole if the grout level dropped in the borehole due to settling.
- Seal the upper three inches of the borehole with Portland cement or asphalt patch, as appropriate.

1.11 SOP-11 Slug Testing Procedures

Slug testing shall be completed using the following equipment and procedures:

Slug Testing Equipment Description

Reusable and expendable equipment and materials required for slug testing includes, but may not be limited to:

Reusable:

- Peristaltic pump
- Electric groundwater level monitoring meter graduated in increments of 0.01 feet
- Field book
- First-aid kit – present on-Site at all times
- Fire extinguisher – present on-Site at all times
- Monitoring well keys
- Five-gallon bucket

Expendable:

- Dedicated Teflon-lined polyethylene and silicon tubing

1.11.1 Slug Testing Procedures

Slug testing procedures include:

- Measure and record the static groundwater elevation within the designated monitoring well using the water level meter.
- Place dedicated Teflon-lined polyethylene tubing into the sampling point to the bottom of the screened interval.

- Measure and record the static groundwater elevation using the water level meter.
- Connect the Teflon-lined polyethylene tubing into the silicon tubing running through the peristaltic pump.
- Connect the discharge end of the silicon tubing to a second piece of Teflon-lined polyethylene tubing (water discharge tubing).
- Re-measure and record groundwater elevation using the water level meter.
- Rapidly remove the water column within the monitoring well using the peristaltic pump. The purge water will be discharged to a five-gallon bucket and handled as investigation-derived waste, per the IDW SOP.
- Record the water levels in the field book as frequently as needed based on the groundwater recharge rate into the well. The test will continue until the water level has returned to within at least 85% of the static level, or in the case of tight formations, for a period of at least 24 hours.
- If 85% recovery is achieved in less than 30 minutes, repeat these steps described above to complete a second rising-head slug test for each well.
- Following slug testing, field personnel will properly discard the expendable equipment in accordance with the IDW Management SOP.

1.11.2 Slug Test Data Evaluation

Each slug test will be analyzed using two different methods, the modified Hvorslev (1951) method, (U.S. Department of Navy, 1982) and Bouwer and Rice (1976). Hvorslev developed a method for the determination of horizontal hydraulic conductivity using measured values of head difference (y) versus time (t). The methodology of data analysis requires the plotting of the head ratio y_t/y_o (percentage of head yet to recover) on a vertical log scale versus time on the horizontal linear scale. Information from this plot is then used to complete the analysis in the following stepwise manner:

Step 1:

Plot y_t/y_o versus t on semi-logarithmic paper as described above.

Step 2:

The straight-line portion is usually considered the most representative portion of the measurements, as the curved part of the plot may be due to wellbore storage, skin or boundary effects.

Step 3:

Select two points on the straight line portion of the curve and record their (t_1, y_1) and (t_2, y_2) coordinates.

Where: $y_1 = \frac{y_{t1}}{y_0}$ and $y_2 = \frac{y_{t2}}{y_0}$

Step 4:

Use the following equation to calculate the horizontal hydraulic conductivity (K) in centimeters per second cm/sec):

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R} \left[\frac{\ln\left(\frac{y_1}{y_2}\right)}{(t2 - t1)} \right] 30.48$$

where: r_c = casing radius (feet);

R = radius of borehole (feet);

L_e = length of screened interval (feet);

t = time (seconds);

y_t = head at time t (feet) ; and,

30.48 = conversion factor.

The Bouwer and Rice method can be used to calculate hydraulic conductivity from the straight-line portion of a semi-log plot of head ratio versus the logarithm of time. The formula is:

$$K = \frac{r_c^2}{2L_e} \ln\left(\frac{R_e}{r_w}\right) \frac{1}{t} \ln\left(\frac{y_0}{y_t}\right)$$

where: R_e = effective radial distance over which y_t is dissipated (feet);

r_w = radial distance of undisturbed portion of aquifer (feet); and,

all other terms are as defined above.

Bouwer and Rice experimentally derived values of R_e, expressed as $ln(R_e/r_w)$, for different values of r_w, L and D by using an electrical analog model. For a partially penetrating well ($H < D$)

$$ln\left(\frac{R_e}{r_w}\right) = \left[\frac{1.1}{ln\left(\frac{H}{r_w}\right)} + \frac{A + B\, ln\left[\frac{(D-H)}{r_w}\right]}{\frac{L}{r_w}} \right]^{-1}$$

where: H = distance from the water table to the bottom of the well intake (feet);

A and B = dimensionless coefficients that are a function of L/r_w; and,

D = saturated aquifer thickness (feet)

2.0 DATA MANAGEMENT PROCEDURES

This section presents the Data Management Procedures that will be implemented during the performance of the field work.

2.1 Analytical Data Record

Golder will use EQuIS® (Environmental Quality Information System) to electronically manage groundwater quality, water level elevation, and soil analytical data. EQuIS® is a web-enabled environmental data management system written in the Microsoft NET Framework, and is hosted at Golder in a Microsoft SQL Server environment. Only authorized Golder personnel have access to the database.

EQuIS® uses a variety of tools and customizable business rules to enforce data quality and provides links to many third-party tools commonly used for data visualizations and data analysis (e.g. EVS/MVS®). Golder will acquire, check, and load the laboratory analytical data into EQuIS® for secure tracking and reporting of data. Golder will not store the results of the MIP/EC and LIF surveys and physical characterization of soils in EQuIS®. These data will be stored and tracked as part of the analytical data records in Microsoft Excel® spreadsheets.

The laboratory analytical data will be acquired, checked and loaded into EQuIS® using the following methods:

- Field samples will be collected following the procedures outlined in the SOPs
- Samples will be delivered to the laboratory for analytical testing. Copies of the chain of custody (COC) and field sample forms will be sent by overnight courier or scanned to electronic copy and e-mailed to the Golder Project Manager
- Following sample analysis, the laboratory will produce and e-mail Electronic Data Deliverables (EDDs) to the Golder Project Manager. Golder will upload the EDDs into the EQuIS® Data Processor (EDP) along with additional information from the field forms. The data added to the EDDs will include, but are not limited to:
  - Sample location codes
  - Sample matrix codes
  - Sample type codes
  - Parent sample codes for replicate samples
  - Sample delivery group codes

Golder personnel will check the information (e.g., time stamps for proper format and test information) and revise as necessary. The EQuIS® EDP will check the EDDs for common laboratory errors, such as chronological event errors, duplicate rows, orphan samples, and inconsistencies with the EQuIS® system's valid value tables. Once the data are checked and reviewed, Golder will upload the EDD packages into the database. The data will then be available to be queried and reported by EQuIS® Enterprise or EQuIS® Professional.

2.2 Data Presentation Format

EQuIS® Enterprise is a read-only web-based reporting function through which data will be processed and reported through a set of customizable pre-designed functions. EQuIS® Professional provides additional format functionality, such as cross-tabbing, trend graphs and isopleths for export to different formats, including Microsoft Excel®. Golder will use a combination of these tools to present analytical result data tables and trend graphs for the Work Plan reports.

Additionally, Golder will use EVS/MVS® modeling to evaluate the distribution of chemicals in Site soil and groundwater. Three-dimensional simulations of chemical distribution, along with chemical mass estimates, will be useful to help evaluate potential future assessment needs and/or remedial measures, if needed.

Specifically, the use of EVS/MVS® will provide the following items in an efficient manner:

- Visual understanding of chemical distribution
- Potential source areas and volumes to focus remedial technology evaluations
- Soil volumes having chemical concentrations above selected criteria and standards
- Information for assessment of future end use options, if applicable

2.3 Project Filing Procedures

Field and analytical data, and associated reports generated by Golder and its subcontractors in performance of the work will be maintained in the Golder Manchester, New Hampshire office. Golder will maintain the records in accordance with our standard document control protocols.

ATTACHMENTS

ATTACHMENT A
UTILITY CONTACT FORM

Iowa One Call Contact Record

1-888-292-8989 (811 IN IOWA)

Golder Associates

Golder field personnel must keep a copy of this completed form on Site during subsurface assessment activities and place a copy in the project file.

Date IOWA ONE CALL contacted:

IOWA ONE CALL Ticket Number:

Project Name: Electrolux Jefferson

Project Number: 103-87305

Golder Employee contacting IOWA ONE CALL :

Project Manager Name:

The following section need to be completed prior to contacting IOWA ONE CALL.

Name and City/State of boring/excavation contractor: Matrix Environmental, LLC, 8631 Jefferson Highway, Osseo, Minnesota

Address/location where work will be completed (address, city, state): 601 East Central Street, Jefferson, IA

Closest Cross Street: North Mulberry Street and East Central Street

Type of Work:

Depth of excavation/boring:

Has the excavation/boring location been pre-marked with white paint? Yes ☐ No ☐

Marking Personnel:

Date:

Where on property will the work will be completed:

Dates work to be completed:

Complete the following section with information provided by IOWA ONE CALL.

Utilities that IOWA ONE CALL will contact under this ticket number (provided by IOWA ONE CALL):

1.

2.

3.

4.

5.

6.

7.

8.

Utilities not contacted by IOWA ONE CALL:

Town Sewer:	Date Contacted:	Contacted by:
Town Water:	Date Contacted:	Contacted by:
Other Utilities:	Date Contacted:	Contacted by:

Approved start date and time to begin work (provided by IOWA ONE CALL):
IOWA ONE CALL Ticket expiration date (provided by IOWA ONE CALL):

IOWA ONE CALL will not contact Town Water and Sewer Departments for markouts. It is Golder's responsibility to contact the Town Water and Sewer Departments for markouts.

Jefferson Water Department: 515-386-2611

Jefferson Wastewater Department: 515-386-4711

ATTACHMENT B

GAS CALIBRATION FORM

GOLDER
ASSOCIATES
GAS CALIBRATION FORM

GAI Project Name: **Electrolux/Jefferson/IA** **Project Number:** **103-87305**
Golder Personnel Present: ____________________

Date: __________

Meter Type: ____________________
Model Number: ____________________
S/N ____________________

Meter Type: ____________________
Model Number: ____________________
S/N ____________________

Lot # Manufacture Date: Expire Date:

			Allowable Range	Reading	Time
H_2S	25 ppm		**23.75-26.25**		
CH_4	2.5%	50% LEL	**2.4-2.6**		
CH_4	5.0%	100% LEL	**4.75-5.25**		
CH_4	15%	>100% LEL	**14.25-15.75**		

Lot # Manufacture Date: Expire Date:

			Allowable Range	Reading	Time
CH_4	50%	>100% LEL	**47.5-52.5**		
CO	50 ppm		**47.5-52.5**		
CO_2	15%		**33.25-36.75**		
N_2	Balance				
O_2	20.90%		**19.86-21.94**		

Lot # Manufacture Date: Expire Date:

			Allowable Range	Reading	Time
Isobutylene	100 ppm		**95-105**		

Weather Conditions : ____________________

Note: Red cylinders valid for 3 years after manufacture date
Aluminum cylinders valid for 13 months after manufacture date

Sampler Signature: Date:

ATTACHMENT C
YSI CALIBRATION FORM

CALIBRATION FORM

GAI Project Name: Electrolux/Jefferson/IA   Project Number: 103-87305

Golder Personnel Present:

Date:

Meter Type: YSI

Model Number: 600XL(M)

S/N

Specific Conductivity   **Lot # :**   **Expire Date:**

Standard	Unit		Meter reading		Time	
1.413	mS/cm					Initial
						Check
						Check

Acceptable Range 1.342-1.484

Dissolved Oxygen

Baro Pressure	Temp °C	% D.O.	mg / L D.O.	D.O. Charge	Time	
						Initial
						Check
						Check

pH

4.01 Buffer: Lot #:   **Exp. Date:**   **7.01 Buffer: Lot #:**   **Exp. Date:**

Standard	Meter reading		Meter reading		Meter reading
	Initial		Check		Check
Time		Acceptable Range			
4.01		3.81-4.21			
7.01		6.75-7.36			
10.00		9.50-10.50			

10.00 Buffer: Lot #:   **Exp. Date:**

ORP   **Lot#:**   **Expire Date:**

Standard	Meter reading		Meter reading		Meter reading
	Initial		Check		Check
Time		Acceptable Range			
240.0		228-252			

Turbidity

Meter Type: LaMotte

Model Number: 20/20

S/N

Standard	Meter reading		Meter reading		Meter reading
	Initial		Check		Check
Time		Acceptable Range			
1.00		0.95-1.05			
10.00		9.50-10.5			

Comments:

Sampler Signature: Date:

ATTACHMENT D

GROUNDWATER SAMPLE COLLECTION FORM

GROUNDWATER
SAMPLE COLLECTION
FORM

Golder Associates

SITE DESCRIPTION

Project Name: Electrolux/Jefferson/IA
Project Number: 103-87305
Location: Jefferson, Iowa

WEATHER CONDITIONS

Temperature: ______
Wind: ______
Precipitation: ______

SAMPLE DESCRIPTION

Sample ID: ______
Date: ______
Time at Well Site: ______
Time of Sample Collection: ______
Sampled by: ______
Sampling Method: Peristaltic Pump
Type of Sampling Equipment: Poly & Silicon tubing

FIELD BLANK NOTES

Field Blank Name: ______
Field Blank /Rinse Water type: ______
Lot Number: ______
Analyses: ______

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: ______ ft TOC
Depth to Water : ______ ft TOC
Column of Water in Well: ______ ft
Depth to Water after Purge: ______ ft TOC

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: ______ inches
Casing Volume: ______ gal/ft
Column of Water in Well: ______ feet
Volume of Water in Well: ______ gallons
Well Volumes to Purge: ______
Min. Volume to be Purged: ______ gallons
Method of Purging: ______
Well Purged Dry?: Yes No

Appearance of Sample: ______

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:						
Volume Removed (liters):						
pH:						
Specific Conductance (uS/cm):						
Temperature (Degrees C):						
Turbidity (NTU):						
Eh (millivolts):						
DO (mg/l) :						

Starting Purge Time: ______
Ending Purge Time: ______
Average Purge Rate: ______ ml/min
Total Volume Purged: ______ liters

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
Volatiles (8260B)	(2) 40 ml vials	NA	HCL
Total Extractable Hydrocarbons	(1) Liter Amber jar	NA	None

Chain of Custody #: ______
Shuttle ID: ______
Trip Blank ID: ______
Lab Name: ______
Air Bill #: ______

REMARKS: 2" - 0.163 gal/ft 1" - 0.014 gal/ft
1.5" - 0.0918 gal/ft

Field Team Leader: ______

ATTACHMENT E

SOIL BORING AND MONITORING WELL INSTALLATION LOG

FIELD BORING LOG

Golder Associates
MANCHESTER, NEW HAMPSHIRE

DEPTH HOLE	JOB NO. 103-87305	PROJECT Electrolux - Jefferson	BORING NO.
DEPTH SOIL DRILL	GA INSP.	DRILLING METHOD	SHEET
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY	SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG / DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER / DROP	STARTED
TIME WL. -----------	HRS. DELAYED	WT. CASING HAMMER / DROP	COMPLETED

Sep 26, 2001 - 4:14pm
Drawing file: FieldLog.dwg

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O	DRIVE OPEN (SPLIT SPOON)
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED OPEN
T.P.	THIN-WALLED PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	MP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION
RANGE OF PROPORTION

"TRACE"	0-10%
"LITTLE"	10%-20%
"SOME"	20%-35%
"ADJECTIVE" (e.g. "SILTY", "SANDY")	35%-50%
"AND"	50%

CONSISTENCY - BLOWS/FT.

NON-COHESIVE SOILS

VL	VERY LOOSE	0-4
LS	LOOSE	4-10
CP	COMPACT	10-30
DN	DENSE	30-50
VD	VERY DENSE	>50

COHESIVE SOILS

VS	VERY SOFT	0-2
S	SOFT	2-4
FM	FIRM	4-8
ST	STIFF	8-30
H	HARD	>30

ELEV. / DEPTH	WELL CONSTRUCTION	PID (ppm)		SAMPLES NO.	TYPE	HAMMER BLOWS PER 6" (FORCE)	REC. / ATT.	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES

ATTACHMENT F
MIP FIELD INFORMATION LOG

MIP FIELD INFORMATION FORM

Golder Associates

SITE DESCRIPTION

Project Name: Electrolux/Jefferson/IA

Project Number: 103-87305

Location: Jefferson, Iowa

WEATHER CONDITIONS

Temperature: ____________

Wind: ____________

Precipitation: ____________

BORING DESCRIPTION

MIP Boring ID: ____________

Date: ________ Start Time: ________

Date: ________ End Time: ________

MIP Contractor: ____________

MIP Operator: ____________

INSTRUMENT INFORMATION

Detectors Used: ____________

Probe Type: ____________

Probe S/N: ____________

LOGGING INFORMATION

MIP File Name: ____________

Pre-Log Response Test File Name: ____________

Response Test Compound: ____________ Concentration: ____________

Trip Time (seconds): ____________

Final Depth of Penetration: ____________

Post Log Response Test File Name: ____________

Response Test Compound: ____________ Concentration: ____________

Trip Time (seconds): ____________

OBSERVATIONS

Adopted from ASTM D 7352-07

ATTACHMENT G

LIF FIELD INFORMATION LOG

LIF FIELD INFORMATION FORM

Golder Associates

SITE DESCRIPTION

Project Name: Electrolux/Jefferson

Project Number: 103-87305

Location: Jefferson, Iowa

WEATHER CONDITIONS

Temperature: __________

Wind: __________

Precipitation: __________

BORING DESCRIPTION

LIF Boring ID: __________

Date: ______ Start Time: ______

Date: ______ End Time: ______

LIF Contractor: Matrix Environmental

LIF Operator: __________

INSTRUMENT INFORMATION

Detectors Used: __________

Probe Type: __________

Probe S/N: __________

LOGGING INFORMATION

LIF File Name: __________

Pre-Log Response Test File Name: __________

Response Test Compound: __________ Concentration: __________

Trip Time (seconds): __________

Final Depth of Penetration: __________

Post Log Response Test File Name: __________

Response Test Compound: __________ Concentration: __________

Trip Time (seconds): __________

OBSERVATIONS